

Installation and Maintenance Instruction Manual



Bimetal Thermometer Modell A and E

for explosion risk areas pursuant to Directive 2014/34/EU. (ATEX)

- according to ASME B40.200: 50=E#====ATEX or 50=ERT#====ATEX

- according to EN 13190: ###=A#====ATEX or ##=ART#====ATEX



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1 General remarks

The thermometer described in these operating instructions is designed using the latest standards, guidelines and findings. During the manufacturing processes, all components are subject to our high quality and environmental criteria. For this purpose, we maintain certified management systems according to ISO 9001 and ISO 14001. For the special requirements of devices for intended use in potentially explosive atmospheres, we maintain a management system according to ISO 80079-34.

The source language of this technical documentation is English, all other languages are based on translations.

1.1 Purpose of this manual

These operating instructions contain basic instructions that must be followed for the installation, operation and maintenance of the device. It must be read by the installer, the operator and the specialist personnel responsible for the device before the device is installed and commissioned. These operating instructions must always be available at the place of use.

The following sections on general safety instructions 2 as well as the following special instructions on intended use 2.2 to disposal 11.2 contain important safety instructions, the non-observance of which may cause health and safety hazards to people, in particular to workers, and possibly to domestic and farm animals, as well as property.

1.2 Symbols

Warning!



.....indicates a potentially hazardous situation, the non-observance of which may cause hazards to the health and safety of people, especially workers, and possibly to domestic and farm animals, as well as property.



Information!

... highlights important information for efficient and trouble-free operation.

1.3 Limitation of liability

Improper use of the equipment, failure to observe the operating instructions, use of unqualified personnel for installation and maintenance work, or unauthorized modifications to this equipment will inevitably result in the loss of liability claims against the equipment manufacturer.

1.4 Copyright

These operating instructions may only be reproduced and passed on as a complete document without the special consent of the publisher.

Subject to technical changes.

1.5 Warranty

For the product described here we grant warranty according to § 6 warranty for defects, in our General Terms and conditions of delivery and payment.

1.6 Manufacturer address, customer service

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2 Safety

2.1 General sources of danger

Temperature measuring devices are usually a part of a DCS system and their failure can lead to dangerous situations. The selection of the temperature measuring device should be made according to the regulations of EN 13190 or ASME B40.200.

2.2 Intended use

The devices may only be used for the purpose intended by the manufacturer.

The intended use of the devices, determined by the manufacturer, is the direct indication of temperature in potentially explosive atmospheres.

When operating the device, care must be taken to ensure that the medium used is harmless to the selected device material. Process media that exhibit changes in the state of aggregation within a range of application can influence the functionality. Negative influences must be avoided for this reason. The process condition of these media must be within the technical limits of the device. In processes measuring temperatures under pressure or other influences, thermowells have to be used.

Especially when used in potentially explosive atmospheres, the limiting values and technical specifications of the device manufacturer must be followed.

Further technical data on the intended use are summarized in the product data sheet, see section 12.1 these instructions.

2.3 Operator's responsibility

Instructions for the proper operation of the device must be observed. They are to be provided by the operator, the respective qualified personnel for installation, maintenance and operation. Hazards due to magnetic fields, electrostatic charges and leaking media due to improper connection of the device must be excluded. The device must be included in the equipotential grounding within the system; this can be ensured by selecting electrically conductive seals.

The device must be taken out of operation and secured against unintentional operation if it must be assumed that safe operation is no longer possible (see chapter 10, Faults).



Opening the device and performing technical modifications by the customer violate the explosion protection approval and are not permitted.

The operational safety of the device and the manufacturer's warranty are only guaranteed if the device is used as intended. The device design, as well as a possible housing filling, must be adapted to the medium and potentially explosive atmosphere used in the plant. The limit values specified in the technical data must not be exceeded.

The safety instructions listed in this operating manual, existing national regulations for accident prevention and internal work, operating and safety regulations must be observed by the operator. Furthermore, he is responsible for ensuring that all prescribed maintenance, inspection and assembly work is carried out by authorized and qualified personnel..

The device is to be regarded as a temperature measuring part of a plant in a potentially explosive atmosphere. The operator of this plant is obliged to carry out an ignition hazard analysis and a zone classification.

2.4 Personnel qualification

The device may only be installed and commissioned by trained specialist personnel.

Specialized personnel are persons who are able to perform the work assigned to them due to their specialized training, experience and knowledge of the country-specific regulations, applicable standards and guidelines. For explosion-protected devices, the personnel must be trained or instructed or authorized to work on explosion-protected devices in hazardous areas.

2.5 Signs/safety marking

The device is provided with a label. The label shows the type designation, measuring range, serial number, year of manufacture, certificate of approval number, filling medium, Ex marking (including X for special conditions of use) and manufacturer.

On the dial the manufacturer, measuring unit, accuracy class, note Silicone-free and the applied standard are visible.

The device may have other labels and safety marks indicating special conditions of use:

- Hot surface
- Note on calibration

The operator must check the label, which is important for the use in potentially explosive atmospheres, at regular intervals to ensure that it remains legible.

The outer packaging is labelled with the type designation, order number, item number, measuring range and manufacturer's data.

2.6 Safety devices

The window is made of laminated safety glass, no other material options are permitted here.

2.7 Environmental protection

This device may optionally contain filling liquid (silicone oil). The provisions of the Regulation on Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) 2006/1907/EC must be observed, the corresponding safety data sheets of the manufacturers of the chemicals, are available for download on our website. At the end of the product life cycle we recommend to recycle the devices, as they are mostly made of stainless steel. Instructions for disassembly, material separation and disposal can be found in chapter 11

3 Use in potentially explosive atmospheres according to Directive 2014/34/EU ATEX

3.1 Range of use:

Potentially explosive atmospheres Zone 1 and 2, as well as 21 and 22, hazard due to gases and dry dusts.

The permissible environment has the usual oxygen content (21%), ambient pressure 80 kPa (0.8 bar) to 110 kPa (1.1 bar).

The requirements of the applicable standards EN ISO 80079-36, EN ISO 80079-37, EN 60079-0 were considered by an ignition hazard assessment. The applicable requirements of these standards have been met.

The documentation has been filed with TÜV-Nord-Cert NB 0044 (see Declaration of Conformity).

Ambient temperatures:

Execution	Min. / Max. permissible ambient temperature
Dry finish	-20°C to +60°C
Silicone filled devices	

Process media temperatures:

Permissible max. media temperature			
Dry finish	Overload temperature short term	Silicone filled devices	Overload temperature short term
max. 500°C	<120°C = 100 % F.S. >120°C up to 289°C = 50% F.S. ≥290°C up to 500°C no overload	max. 300°C	<120°C = 100 % F.S. >120°C up to 200°C = 50% F.S. >200°C up to 300°C no overload

F.S. = full scale value

The medium temperature depends on the ignition temperature of the surrounding gas, vapours or dust, on the design of the device, especially the convection heat and the surface, as well as the ambient temperature and other external heat sources. The device itself does not have its own heat source.

Temperatures in explosive atmospheres - Gases and vapours

EPL	Temperature classes Ignition temperatures for gases and vapours	Permissible, max. surfaces incl. ambient temperature	
		Dry finish	Liquid filled devices
Gb	T1 (> 450°C)	425°C	250°C
	T2 (> 300°C ... ≤ 450°C)	290°C	250°C
	T3 (> 200°C ... ≤ 300°C)	195°C	195°C
	T4 (> 135°C ... ≤ 200°C)	130°C	130°C
	T5 (> 100°C ... ≤ 135°C)	95°C	95°C
	T6 (> 85°C ... ≤ 100°C)	80°C	80°C

The maximum surface temperature including the ambient temperature, for the application on site, depends on the device type with its technical specifications. The lowest temperature limits apply in each case.



For the device type with a compression fitting, the stem length "S" is adjustable. If a part of the stem is not inserted in the process, the temperatures transmitted by the protruding stem must be determined. These temperatures are to be included in the user's ignition hazard assessment.

In order to ensure proper functioning of the thermometer, a minimum immersion depth of the stem in the media of 65 mm to 100 mm, depending on the instrument type, must be observed.

Temperatures in explosive atmospheres - Dusts

For the determination of the ignition temperature, the method according to ISO/IEC 80079-20-2 is to be used. This can only be carried out by the user on site for the individual case. The device-specific properties as well as the limit temperatures of the dusts and their form as a deposited layer or in the form of a surrounding dust cloud must be taken into account here. For this reason, the ignition temperatures must be determined separately. In the case of dust layers, the thickness of the dust layer must be taken into account as a further criterion.

EPL	Ignition temperature	Permissible max. surface temperature dusts
Db	Minimum ignition temperature for dust clouds T_{cloud} [°C]	$T_{max} = 2/3 T_{cloud}$
	Minimum ignition temperature with dust layers T_{5mm} [°C].	$T_{max} = T_{5mm} - 75 K$

In case of a malfunction, the maximum medium temperature may be considered as the surface temperature to be determined.



For device types with every angle connection, the dust support surface may change depending on the position selected by the user. These changed surfaces must be taken into account in the user's ignition hazard assessment. For the device type with a compression fitting, the stem length "S" is adjustable. If part of the stem is not located within the process, the derived temperatures must be determined at the protruding stem, as this will increase the dust contact area. These temperatures must also be included in the user's ignition hazard assessment.

For mounting locations that allow weather influences, these influences must be minimized by suitable measures. To avoid additional heating, the devices must not be exposed to any external heat source during operation! Convection heat from the direct environment of the devices must also be avoided.



The devices must not be operated in potentially explosive areas of a plant in which an explosive mixture of gases and dusts is present in the atmosphere.

Labelling:

Ex marking according 2014/34/EU				Ex marking according ISO 80079-36 / 80079-37				
CE	Ex	II	2G 2D	Ex h	IIC IIIC	T6...T1 T85°C...T450°C	Gb Db	X
CE	Conformity mark							
Ex	Explosion protection mark							
II	Group II equipment is intended for use in locations with explosive gas atmospheres, excluding mine gas and/or dust from hazardous mining operations.							
2G	Equipment group for gases and vapors in which an explosive atmosphere may occasionally occur during normal operation.							
2D	Equipment group for dusts in which an explosive atmosphere may occur during normal operation or for a short period.							
Ex h	Marking according to the equipment protection level for non-electrical equipment in potentially explosive atmospheres							
IIC	Suitable for gas atmosphere IIC							
IIIC	Suitable for combustible suspended solids, non-conductive and conductive dust							
T6...T1 T85°C...T450°C	Maximum surface temperatures which are mainly dependent on the operating conditions							
Gb	Equipment protection level for gases containing all potential ignition sources that are effective, which may occur during normal operation, rare and expected malfunctions.							
Db	Equipment protection level for dusts containing all potential ignition sources that are effective, which may occur during normal operation, rare and expected malfunctions.							
X	Special operating conditions must be observed and can be found in the operating instructions.							

3.2 Special operating conditions for safe use in potentially explosive atmospheres

- Maintenance work to be carried out, from chap. 9
- To avoid possible spark generation due to static charge, the device should always be cleaned with a damp cloth.
- The legibility of the nameplates must be checked at regular intervals. It must remain legible throughout the entire period of use of the device. If a reliable reading is no longer given, please contact the manufacturer.
- Impacts on the device must be avoided at all costs. Impacts or shocks can produce sparks.
- It is the responsibility of the operator to evaluate attached process components or accessories together with the delivered device by means of an ignition hazard analysis. The operator must recognize the ignition hazards and prevent them by using appropriate protective measures.
- The operator must comply with the points from chapter 2.3 "Responsibility of the operator".

4 Technical data

For detailed technical data, please refer to the documents in the appendix chapter 12.1

5 Marking of the device

The nameplate with serial number and type designation is located on the housing. The materials used for the wetted parts as well as other device-specific versions are represented by a type coding on the nameplate and can be broken down at any time with the aid of the data sheet. The marking for the hazardous areas, in the form of the description of the type of protection, the permissible ambient temperature and the deposit number, are located in the lower area of the nameplate.

ASHCROFT
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160=AE=L=070=L=215=N20_10
0C=SG=ATEX=NH=EN

Filling : Silicone
Range : -20/100 °C
S/N : 211001385420



II 2G Ex h IIC T6... T1 Gb X
II 2D Ex h IIIC T85°C... T450°C Db X
Ta = -20°C to +60°C

EU File No.: 35088073

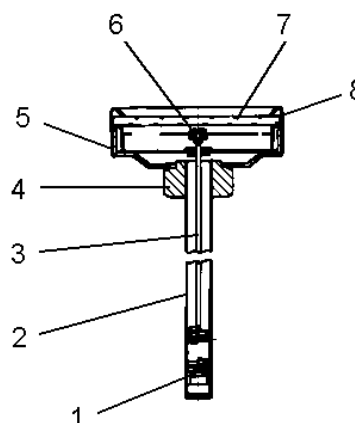


Do not open the case!

6 Structure and function

6.1 Overview

- 1 Bimetallic coil
- 2 Stem
- 3 Shaft
- 4 Process connection
- 5 Case
- 6 Pointer
- 7 Window
- 8 Ring



6.2 Functional description

The temperature is transferred through thermal conduction onto the bi-metal helix, which is firmly gripped on one side. Due to its construction, using 2 metals with different coefficients of thermal expansion, it rotates proportionally to the temperature change. This rotary motion is transferred via a shaft to the pointer. The angle of rotation for the complete range is approx. 270°.

6.3 Description of the components

6.3.1 Stem

The stem with a diameter of 6 mm - 9.6 mm and a length of 63 mm - 1500 mm contains the bimetallic coil on the side facing away from the housing. To ensure proper functioning of the thermometer, a minimum immersion length of the stem in the media of 65 mm to 100 mm, depending on the measuring range, must be ensured.



If the process medium is also subject to pressure or flow during temperature measurement, a thermowell has to be used.

6.3.2 Dial with pointer

The thermometer is equipped with a dial and pointer pursuant to EN 13190 or ASME B40.200.

6.3.3 Instrument connection

The instrument connection is located at the back of the instrument and is designed as a threaded or compression connection. Instrument connections with an every angle connection allow the housing to be aligned according to the installation situation.

6.4 Accessories

Please contact the manufacturer for information on special sealing materials and accessories.

7 Transportation

The device must be protected against impact. Transport must be carried out exclusively in the glass-break-proof packaging provided for transport. The device shall only be transported in a cleaned condition (free of residual media).

7.1 Delivery

The delivery is to be checked for completeness and transport damage. In case of transport damage, the delivery is not to be accepted or only with reservation, the extent of damage is to be noted and, if necessary, a complaint is to be initiated. In these cases, please contact our service department.

7.1 Storage

The storage of the devices should exclude external influences as far as possible to avoid damage to the devices. Vibrations or impact effects must be avoided, and the limit values of the storage temperatures must be taken into account.

Permissible storage temperature: -40 to +60°C

8 Assembly/Installation

8.1 Preparation

To ensure safe working during installation and maintenance, suitable thermowell must be installed in the system, by means of which the unit can be

- can be removed for repair or inspection within the plant
- subjected to a functional check on site.

The suitability of the device and the thermowell (if required) for the medium to be measured, the selection of the measuring range and the protection against special conditions such as vibrations must be checked.

During assembly/installation work, the system must be secured against being switched on again.

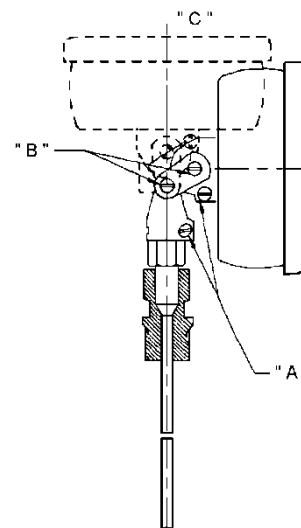
It is recommended to perform the assembly / installation without an existing explosive atmosphere (e.g. ventilated room).

8.2 Requirements for the installation site

- Check the suitability of the device for the process media to be measured,
- Design of the measuring range to the requirements of the measurement,
- Ex works, the device is supplied and calibrated for vertical installation.
- If the installation location deviates from the vertical (max. $\pm 5^\circ$), the zero setting on the indicator must be corrected (see 8.4.1 Zero adjustment).
- Protection against mechanical vibration, e.g. by means of a flexible capillary line.
The following limits must not be exceeded under any circumstances:
Frequency of mechanical vibration: max. 150 Hz
Acceleration: max. 0.5 g (approx. 5 m/s²)

8.2.1 Every angle connection (optional)

- Only adjust the every angle connection if this is necessary during fitting or removal.
- Use the every angle connection to place the sensor in the correct position prior to installation, proceeding as follows:
 - Position the thermometer housing in a straight alignment (Position "C")
 - Using the screws marked "A", loosen until the joint can be turned freely through 180° on the lower part of the housing and the sensor.
 - Hold the thermometer housing firmly with one hand, and with the other hand turn the joint piece until the inner part of the joint is showing in the desired direction of bend.
 - Firmly tighten the aforementioned Screws "A" again.
 - Loose the screws marked "B" and move the joint into the desired direction of bend.
 - Firmly tighten the aforementioned Screws "B" again.



8.3 Process connection

The process connections comply with the general technical regulations for thermometers. Thread types and materials of the process connections may vary depending on the application..

- Assembly of the device only by authorized and qualified personnel.
- The device must be integrated into the equipotential bonding of the process installation (e.g. by using an electrically conductive seal).
- Use only with the mechanical process connection provided – regarding the configuration, see order code on the device type label.

- When connecting the device without using a thermowell, the pipes must be depressurized.
- Do not allow any mechanical force to be applied to the stem; in particular, pay attention to matching the "S" lengths of the thermometer and the thermowell, to avoid contact against the base of the thermowell.
- A thermal transfer medium (heat conducting paste) in the thermowell improves the reaction time and reduces the measurement error caused by the thermal transfer.



**Only mount using the correct open-jawed wrench, and do not twist the device itself.
Do not insert moist or oily stem into hot thermowell.**

8.4 Starting up

The precondition for start-up is correct installation. All connecting lines must be laid such that no mechanical forces can act on the device.

8.4.1 Zero adjustment

On thermometers with an external adjustment option, rotate using a screwdriver until the pointer is showing the desired temperature on the scale.

8.5 Subsequent relocation of the thermometer



Do not disassemble the device from the measuring point in order to mount it at another measuring point without cleaning it first (cleaning the stem and thermowell). There is a risk of mixing media with unpredictable chemical reactions.

9 Maintenance

The device is maintenance-free. However, to ensure reliable operation and a long service life of the device, we recommend that it is checked regularly.

9.1 Function check and recalibration

The check on function and recalibration is carried out at regular intervals, depending on the application. The precise testing cycles should be adjusted in line with the operating conditions and ambient conditions.

- Check on display.
- Check the thermowell for damage and seal.
- Recommended calibration interval: annual

9.2 Cleaning and maintenance

Cleaning is carried out with a non-aggressive cleaning agent and a damp soft cloth to avoid electrostatic charging. In the same work process, care can be taken to detect possible damage to the device at an early stage. If any damage is detected, the unit should be handed over to the manufacturer's service department immediately.

10 Faults

All defective or faulty equipment must be taken out of service. Defective or faulty devices should be handed over to the manufacturer's service department immediately. Under no circumstances repair attempts should be made on site. Device safety can no longer be guaranteed.

Contact details see chap. 1.6

Fault	Possible causes	Possible measures
Jerky or random pointer movement	Bended stem, bended every angle connection	Check for mounting errors and installation location. Replace device if necessary
Bent or loose pointer	Damage with transport or external rough impact	Repair by the manufacturer
Cracked window	External influences	Repair by the manufacturer
Leakage with filled device	High solar radiation, operation outside the device specification	Repair by the manufacturer
Case damage	Improper handling	Check installation location, Device must be replaced
Signs of leakage of the measuring system (discoloration of the dial or the filling liquid).	Process media not compatible with the material used for the thermowell, installation location with excessive external influences	Improper use, Replace device Adapt thermowell material to process media

10.1 Behaviour after rectifying the fault

See chapter 8 Assembly and Installation

11 Dismantling & disposal

11.1 Disassembly

- During maintenance work on an unit installed without thermowell, the lines must be depressurized and the system must be secured against being switched on again.
- Dismantle the measuring device using a suitable tool.



Residual media in and on dismantled measuring instruments can endanger people, the environment and equipment. Sufficient precautionary measures must be taken. If necessary, the devices must be cleaned thoroughly (see notes in the safety data sheets).

11.2 Disposal



At the end of the product life cycle, do not dispose of this product with normal household waste. Take this product to a collection point or a specialist disposal company for recycling of the components

With the help of the product coding and our data sheets (see Appendix 12 available on our website) you will receive the necessary information to be able to carry out a material separation yourself. Our devices described in this manual are mostly made of stainless steels, which can be recycled. Before disassembling, check if there is a device filled with silicone oil. This oil must first be drained off and collected in accordance with the safety instructions in the safety data sheet. Then separate the case ring, which carries the window, from the case using a strap wrench. For device with crimped housing ring, these can be cut open with a pliers. The sealing ring and flat glass can be removed. Next, remove the pointer and dial, which are made of aluminium, everything else is made of stainless steel..

Materials to be recycled:

- Filling fluid (oil see data sheet)
- Stainless steel (case, ring, process connection, stem, bimetallic coil, see data sheet)
- Dial and pointer (aluminium)
- Window (see data sheet glass or plastic)
- Seals (sealing ring of the sight glass, venting device, pressure relief device)

Please help to protect our environment!



Some of the product materials can be reused if you take the product to a collection point or to a waste management company. By reusing some parts or raw materials from used products, you make an important contribution to protecting the environment.

Our products are delivered in optimized packaging. This essentially means that materials are used which can be recycled as secondary raw materials at the local disposal service. For more information on the disposal of packaging, please contact your local administration.




12 Appendix

12.1 Data sheet Bimetal Thermometer Ax / Ex


Detailed data sheets are available directly from the manufacturer (see 1.6Manufacturer address, customer service).

Model	Designation	Document
AI, AE, AM, A3B,	Stainless steel bimetal thermometer Model A according to EN 13190	DS BIM AxEx
EI, EE, EM, E3B	Stainless steel bimetal thermometer Model E according to ASME B40.200	DS BIM AxEx
ART, ERT	Stainless steel bimetal thermometer with stepped stem Model ART and ERT	DS BIM-RT

12.2 EU Declaration of Conformity



 <p>ASHCROFT® Trust the shield.™</p>	<p>EU-Konformitätserklärung EU-Declaration of Conformity EN ISO / IEC 17050-1:2010</p>
<p>Ashcroft Instruments GmbH Max-Planck-Straße 1-9 52477 Aisdorf</p>	
<p>erklärt in alleiniger Verantwortung, dass die mit CE gekennzeichneten Produkte <i>declares in sole responsibility that the products marked with CE</i></p>	
Gerät: Equipment:	<p>Temperaturmessgeräte vom Typ AM, AE, AI, A3B, ART, TBA (EN) EM, EE, EI, E3B, ERT, TBE (ASME) nach dem Prinzip der Bimetall Wendel <i>Temperature measuring instruments of type AM, AE, AI, A3B, ART, TBA (EN) EM, EE, EI, E3B, ERT, TBE (ASME) on the principle of the bimetallic coil</i></p>
Kennzeichnung: Marking:	<p>TÜV 35088073</p> <p style="text-align: center;">   </p> <p>II 2G Ex h IIC T6...T1 Gb X II 2D Ex h IIC T85°C...T450°C Db X Ta = -20°C to +60°C</p>
Herstellungsdatum: Date of manufacture:	<p>ab 01.11.2024 <i>from 1st of November 2024</i></p>
<p>die grundlegenden Sicherheits- und Schutzanforderungen erfüllen, in Übereinstimmung mit den unten genannten Richtlinien und Normen. Die Konformitätsaussage bezieht sich auf die Konzeption und Fertigung der oben genannten Produkte. <i>the fundamental safety and protection requirements passed in accordance with the guidelines and standards listed below. This declaration of conformity refers to the design and manufacture of the above products.</i></p>	
Richtlinie Directive	2014/34/EU „Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen“ <i>“equipment and protective systems intended for use in potentially explosive atmospheres”</i>
Harmonisierte Normen Harmonized Standards	EN ISO 80079-36:2016, EN ISO 80079-37:2016, EN 1127-1:2019
Benannte Stelle 0044 Notified Body	TÜV NORD CERT Langemarkstrasse 20 45141 Essen, Germany <i>Code number of notified Body 0044</i>
Hinterlegungsnummer: Dossier File No.:	35088073
Angewendete Prüfnormen: Used test standards:	EN 13190:2001, ASME B40.200:2008
Richtlinie Directive	2011/65/EU „Richtlinie zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten“ <i>“Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment”</i> 2015/863/EU „Änderung von Anhang II der Richtlinie 2011/65/EU“ <i>“Amending Annex II to Directive 2011/65/EU”</i>
Bewertung Evaluation	Die oben aufgeführten Produkte fallen nicht unter diese EU Richtlinie, da es sich nicht um elektrische oder elektronische Geräte handelt. <i>The products listed above are not covered by this EU Directive as they are not electrical or electronic equipment.</i>

Aisdorf, den 21.10.2024
Ort und Datum
Place and date



ASHCROFT®
ATEX Verantwortlicher
ATEX Manager

Digitale Ausführungen nur mit validierter Unterschrift gültig. Die gültige Validierung ist in einem unveränderten Dokument enthalten.
Digital executions valid only with validated signature. The valid validation is included in an unmodified document.

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